DOCUMENT RESUME

ED 314 495 TM 014 416

AUTHOR Melancon, Janet G.; Thompson, Bruce
TITLE Measurement Characteristics of the Finding Embedded Figures Test in "Speed" versus "Power" Administrations.
PUB DATE Jan 90
NOTE 26p.; Paper presented at the Annual Meeting of the Southwest Educational Research Association (Austin, TX, January 25-27, 1990).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Comparative Testing; Construct Validity; Guessing (Tests); Higher Education; Item Analysis; Measurement; Meta Analysis; Middle Schools; Multiple Choice Tests; *Psychometrics; Secondary Education; *Secondary School Students; *Test Format; Test Items; Test Theory; Test Validity; *Timed Tests; *Undergraduate Students
IDENTIFIERS *Finding Embedded Figures Test; *Power

ABSTRACT

Classical measurement theory was used to investigate measurement characteristics of both parts of the Finding Embedded Figures Test (FEFT) when the test was: administered in either a "no guessing" supply format or a multiple-choice selection format; administered to either undergraduate college students or middle school students; and completed in a timed ("speed") format as opposed to untimed ("power") format. Analysis is based on data from several studies conducted by Melancon and Thompson in 1989: (1) 69 undergraduates in the "power" supply format study; (2) 155 undergraduate students completing the FEFT in a "power" multiple-choice format study; (3) 1,528 middle school students completing the FEFT in a "power" multiple-choice format; and (4) 45 undergraduate students completing the FEFT in a "speed" selection administration format in the present study. Coefficient alpha for the FEFT ranged between 0.86 and 0.90 across samples and administration formats. Items generally had desirable psychometric characteristics across the studies. Construct validity analyses support a conclusion that the measure is reasonably valid. A 37-item list of references is included. Five tables present results from the studies. (SLD)

ft12sera.wp 1/5/90

MEASUREMENT CHARACTERISTICS OF THE FINDING EMBEDDED FIGURES TEST IN "SPEED" VERSUS "POWER" ADMINISTRATIONS

Janet G. Melancon
Loyola University of the South

Bruce Thompson
University of New Orleans

Paper presented at the annual meeting of the Southwest Educational Research Association, Austin, TX, January 25, 1990. Request reprints from: Bruce Thompson, Research Professor of Education, College of Education, University of New Orleans, New Orleans, LA 70148.

ABSTRACT

The study applied classical measurement theory to investigate the measurement characteristics of both parts of the Finding Embedded Figures Test, when the test is administered in either a "no guessing" supply format or a multiple-choice selection format, when the FEFT is administered to either undergraduate college students or to middle school students, and when the test is completed in a timed or "speed" format as against an untimed or "power" format. Analysis was based on data provided by 69 undergraduate subjects in the "power", supply format study (Melancon & Thompson, 1989c); 155 undergraduate students completing the FEFT in a "power", multiple-choice format study (Melancon & Thompson, 1989a); 1,5[illegible] middle school students completing the FEFT in a "power", multiple-choice format (Melancon & Thompson, 1989b); and 45 undergraduate students completing the FEFT in a "speed", selection administration format in the present study. Coefficient alpha for the FEFT ranged between 0.86 and 0.90 across samples and administration formats. Items generally had desirable psychometric characteristics across studies. Construct validity analyses were supportive of a conclusion that the measure is reasonably valid.

In the years immediately following World War II, Herman A. Witkin and his colleagues performed a series of historically important studies (e.g., Witkin, 1949) involving stylistic variations in perceptions of visual stimuli. These initial studies investigated variations in ability to perceive the upright in the absence of normally-available orienting stimuli. Witkin, Moore, Goodenough and Cox (1977, pp. 3-4) present photographs of the apparatuses used in these early "rod-and-frame" and "body-adjustment" tests. Heesacker (1981) presents a summary of the early years of this important research, and of the antecedents of the work dating back to the previous century (Jastrow, 1892).

Witkin's early work led to the development of the theory of psychological differentiation and the delineation of a cognitive style that has come to be called field independence/dependence (Goodenough & Witkin, 1977, pp. 2-3). Persons who tend to operate on the field independence (FI) end of this cognitive style continuum tend to perceive themselves as more segregated from their environments; these persons tend to be more analytical in their abilities and interests. Persons who tend to operate on the field dependence (FD) end of the continuum, on the other hand, tend to be less able either to distinguish among or to reorganize stimuli; these persons tend to be more social in their abilities and interests.

Field independence is the most researched of the 19 cognitive styles that have been identified (Goldstein & Blackman, 1978; Messick, 1976). For example, a comprehensive bibliography of

studies involving the field-independence construct cites several thousand studies (Cox & Gall, 1981). Various researchers (cf. Doebler & Eicke, 1979, p. 226; Donlon, 1977, p. 1; Laosa, 1978, p. 3; Rasinski, 1983, p.1; Witkin, Moore, Goodenough & Cox, 1977, p. 1) concur that the construct of field-independence has stimulated great interest.

Numerous studies indicate that field-independence has noteworthy associations with myriad outcomes; several reviews of these studies are available elsewhere (cf. Goodenough, 1976; Go denough & Witkin, 1977; Melancon & Thompson, 1987; Witkin, Moore, Goodenough & Cox, 1977). However, the general tenor of these diverse findings can be gleaned by considering a few of the many available citations. Field-independence has been found to be related to diverse outcomes, including vocational choice (Witkin, Moore, Oltman, Goodenough, Frie ıan, Owen & Raskin, 1977); concept-learning abilities (Stasz, Shavelson, Cox & Moore, 1976); and to performance in specific subject areas such as reading (Pitts & Thompson, 1984; Spiro & Tirre, 1979). Field-independence also affects reaction to different instructional interventions and conditions (cf. Paradise & Block, 1984).

Cox and Gall (1981, p. 5) cite 16 measures that have been employed with varying frequency to measure aspects of perceptual disembedding ability. However, the most frequently used measure has been the Group Embedded Figures Test (Witkin, Oltman, Raskin & Karp, 1971). The Group Embedded Figures Test (GEFT) has been frequently used, in part because the measure has exceptional

psychometric integrity even when evaluated by sophisticated measurement theory such as generalizability theory (Thompson & Melancon, 1987b), or when used with children (Thompson, Pitts & Gipe, 1983).

Although the GEFT has proven to be a very useful measure of aspects of field independence, the measure does have some limitations. The primary limitation is that the GEFT employs a "supply" format in which subjects literally draw on the target figure embedded within a stimulus. As Donlon (1977, pp. 1-2) notes, "From the standpoint of a large-scale administration, however, the GEFT has the drawback of requiring trained personnel to score each item."

Melancon and Thompson (1987) present in detail the first phase of development of a multiple-choice perceptual disembedding measure, the Finding Embedded Figures Test (FEFT). The FEFT (Thompson & Melancon, 1987a) was developed to provide a multiple-choice, machine-scoreable measure of perceptual disembedding or restructuring as an alternative to supply-format tests such as the GEFT. The characteristics of this measure have been investigated in a series of studies involving various samples and analytic methods (Melancon & Thompson, 1987, 1988, 1989a, 1989b, 1989c, 1989d, in press; Thompson & Melancon, 1988).

Previous studies of the FEFT have employed an untimed or "power" administration format. As Gronlund (1985, p. 18) explains, "A speed test measures the number of items that an individual can complete in a given time, whereas a power test measures the level

of performance under ample time conditions." However, as Witkin et al. (1971, p. 28) note, "the GEFT is a speed test." Witkin et al. (1971, p. 27) offer the following rationale for the use of a "speed" administration format:

> The time limit of 5 minutes for the [scored] Second and Third [GEFT] Sections was set on the basis of pretesting which indicated that, for our college samples, this time limit permitted a portion of subjects to attempt every item and also yielded a normal-appearing frequency distribution with a wide range of scores.

The present study was conducted to determine the psychometric properties of the FEFT when the test is administered in a "speed" format. Since slightly less than one minute per item is allocated in conventional GEFT administrations, the same procedure was followed in the present study, and subjects were given 25 minutes to complete each FEFT Part, each consisting of 35 items. Three questions were posed in the present study. First, how do the alpha coefficients for data from the FEFT compare across studies? Second, how do test and item difficulty and discrimination coefficients compare across administrations? Third, how do variables such as gender and age influence FEFT performance? Table 1 presents information about the demographic characteristics of the subjects in the present study and in comparison studies involving "power" administration formats (Melancon & Thompson, 1989a, 1989b, 1989c, in press).

INSERT TABLE 1 ABOUT HERE.

Results

The study's first research question involved a comparison of alpha coefficients for FEFT data across studies. These data are presented in Table 2 for various item combinations, including (a) the 20 unique items from FEFT Part A and the 20 unique items from Part B; (b) the 20 unique and the 15 linking items from Part A and the 20 unique items from Part B; (c) the 20 unique items from Part A and the 20 unique and the 15 linking items from Part B; and (d) all 70 (35 + 35) FEFT items.

INSERT TABLE 2 ABOUT HERE.

The study's second question involved comparison of item difficulty and discrimination coefficients across studies. Tables 3 and 4 present these results. Proportion correct statistics are tabled as P values. Item-score-to-total-score correlation coefficients, corrected by omitting scores on a given item from the total scores with which the item scores (0 or 1) are correlated so that each total Part score involved 34 items (35-1), are presented for each FEFT Part as "Corr IxAr" or "Corr IxBr". Corrected item-score-to-total-score correlation coefficients for composite FEFT scores, each total score involving 69 items (70-1),

are presented as "Corr IxTr". Item score correlations with scores on the GEFT are presented as "Val r". The last two columns of Tables 3 and 4 present mean item statistics across the four studies.

INSERT TABLES 3 AND 4 ABOUT HERE.

The study's third research question involved the influence of demographic variables, such as gender and age, on FEFT scores. The mean number of right answers on the total FEFT for males (54.5, SD=11.6) and females (51.0, SD=8.8) did not differ to a statistically significant degree (F=1.04, df=1/43, p=.31). Of course, since sample size exerts such a noteworthy influence on significance tests, it is important to directly consult effect sizes in addition to significance tests (Thompson, 1989). Eta-squared or the correlation ratio for this comparison was 2.4% (92.2 / 3,916.6). These results are comparable to those reported by Melancon and Thompson (1989b).

Table 5 reports comparisons of means across various sample types and administration formats. These comparisons bear upon issues such as whether age appears to influence FEFT scores.

INSERT TABLE 5 ABOUT HERE.

An ancillary analysis was conducted to investigate the test-retest reliability of the 15 linking items ("L01", "L02", etc.)

used twice, once on each FEFT Part. The correlation of scores on the 15 Part A linking items with the scores on the same 15 items used again in Part B was .75. However, these results were attenuated by the limited reliability of scores (alphas respectively equalled .70 and .70) derived from using only 15 linking items in each test Part. After correction for this attenuation (Guilford, 1954, p. 400), the test-retest reliability was calculated to be essentially perfect. This result is slightly more favorable than the corrected result (.95) reported by Melancon and Thompson (1989b).

Another ancillary analysis correlated (r = .71) FEFT total scores with GEFT scores. After correction for attenuation due to unreliability in the two score sets, the corrected correlation coefficient was .80.

Discussion

The study's first research question involved comparison of alpha coefficients for Finding Embedded Figures Test data across studies. As reported in Table 2, coefficient alpha for the FEFT ranged between 0.86 and 0.90 across samples and administration formats. As Crocker and Algina (1986, p. 142) note, alpha "is not a direct estimate of the reliability coefficient but rather an estimate of the lower bound of that coefficient." Thus, these results seem favorable with respect to a conclusion that the FEFT yields reasonably reliable scores.

The study's second research question involved comparison of item difficulty and discrimination coefficients across

administrations. These statistics are emphasized in classical test theory, as Thompson and Levitov (1985) explain. For a five-choice item, most theorists would consider a proportion-correct P value of about 0.6 ([(1 - 1/5)/2] + 1/5) to be roughly ideal (Thompson & Levitov, 1985), if item difficulty was the only consideration. Thus, the results presented in Tables 3 and 4 suggest that regardless of administration format or sample type the FEFT items generally are somewhat too easy. However, Part B items perform closer to expectation, especially when these items are administered to middle school students. Furthermore, the comparability of the P values for the 15 linking items common to both test Parts suggests that item context does not itself appreciably affect item difficulty, since the P values for given linking items used on both FEFT Parts tended to be comparable within studies. For example, the P value for linking item one ("L01") was 1.000 when the item was used in Part A (#3) versus 1.000 for the same item (#1) on Part B (Melancon & Thompson, 1989c); 0.911 versus 0.909 for linking item one's P values in the Melancon and Thompson (1989a) study; 0.885 versus 0.818 for linking item one's P values in the study with middle school students (Melancon & Thompson, 1989b); and .956 versus .956 in the present study involving a "speed" administration.

It is generally hoped that test takers who do better on a given item will also do better on all the other items in the pool. Positive and larger discrimination r values are desirable (Thompson & Levitov, 1985). As reported in Tables 3 and 4, in

selection format administrations corrected discrimination coefficients tended to average slightly less that 0.3. Few Part A items, and even fewer Part B items, had negative discrimination coefficients. Thus, the tabled results are also favorable with respect to desired item discrimination characteristics.

The study's third research question involved the associations of gender and age with FEFT scores The correlation ratio or eta-squared effect sizes for gender were negligible in both the present study and in previous studies. These results are somewhat at variance with GEFT studies in which sex differences have been isolated (cf. Melancon & Thompson, 1987, p. 32; Witkin, 1979). This result may mean that (a) our subjects have not been as sex-typed as the subjects in previous GEFT studies, (b) society has changed enough that previously detected sex effects no longer exist, or that (c) the FEFT is more sex-fair than the GEFT. Some research suggests that GEFT sex effects are learned (Berry, 1966). Nevertheless, the tenability of these rival hypotheses remains to be explored in future research.

The cross-sectional finding that students do somewhat better as they age, as reported in Table 5, is consistent with previous findings that people tend to become more field independent as they age (Melancon & Thompson, 1987, pp. 36-37). However, people tend to remain <u>intraindividually</u> stable in style across time, i.e., placement relative to others in a cohort tends to remain fairly constant even though the cohort tends to become more field independent with aging.

Overall, the results reported here are supportive of a conclusion that the Finding Embedded Figures Test has reasonable psychometric integrity. This result is encouraging, but FEFT must still be considered a research edition until more evidence is garnered in construct validity studies involving the kinds of diverse outcomes already examined in relation to the GEFT (e.g., Pitts & Thompson, 1984; Witkin, Moore, Oltman et al., 1977). The promise of a sound multiple-choice alternative to the GEFT may warrant these inquiries.

References

Berry, J.W. (1966). Temne and Eskimo perceptual skills. International Journal of Psychology, 1, 207-229.

Cox, P. W., & Gall, B. E. (1981). Field dependence-independence and psychological differentiation: Bibliography with index supplement No. 5. Princeton, NJ: Educational Testing Service. (ERIC Document Reproduction Service No. ED 214 977)

Crocker, L., & Algina, J. (1986). Introduction to classical and modern test theory. New York: Holt, Rinehart and Winston.

Doebler, L. K., & Eicke, F. J. (1979). Effects of teacher awareness of the educational implications of field-dependent/field-independent cognitive style on selected classroom variables. Journal of Educational Psychology, 71, 226-232.

Donlon, T. F. (1977, May). A practical assessment of field dependence/independence. Paper presented at the annual meeting of the New England Educational Research Association, Manchester-Bedford, NH. (ERIC Document Reproduction Service No. ED 139 827)

Goldstein, K. M., & Blackman, S. (1978). Cognitive style. New York: Wiley.

Goodenough, D. R. (1976). The role of individual differences in field dependence as a factor in learning and memory. Psychological Bulletin, 83, 675-694.

Goodenough, D. R., & Witkin, H. A. (1977). Origins of the field-dependent and field-independent cognitive styles (Report No. ETS-RB-77-9). Princeton, NJ: Educational Testing Service.

(ERIC Document Reproduction Service No. ED 150 155)

Gronlund, N.E. (1985). Measurement and evaluation in teaching (5th ed.). New York: Macmillan.

Guilford, J.P. (1954). Psychometric methods (2nd ed.). New York: McGraw-Hill.

Heesacker, M. (1981, August). A review of the history of field dependence. Paper presented at the annual meeting of the American Psychological Association, Los Angeles. (ERIC Document Reproduction Service No. ED 211 888)

Jastrow, J. (1892). On the judgment of angles and positions of lines. American Journal of Psychology, 5, 220-223.

Laosa, L. M. (1978). Maternal teaching strategies and field dependent-independent cognitive styles in Chicano families (Report No. ETS RB 78 12). Princeton, NJ: Educational Testing Service.

Melancon, J. G., & Thompson, B. (1987, November). Measurement characteristics of a test of field-independence: Literature review and development of the Finding Embedded Figures Test. Paper presented at the annual meeting of the Mid-South Educational Research Association, Mobile, AL. (ERIC Document Reproduction Service No. ED 292 823)

Melancon, J. G., & Thompson, B. (1988, November). Latent trait measurement calibrations for the Finding Embedded Figures Test. Paper presented at the annual meeting of the Mid-South Educational Research Association, Louisville, KY. (ERIC Document Reproduction Service No. ED 300 463)

Melancon, J., & Thompson, B. (1989a). Measurement characteristics of the Finding Embedded Figures Test. Psychology in the Schools, 26(1), 69-78.

Melancon, J.G., & Thompson, B. (1989b, November). Measurement characteristics of the Finding Embedded Figures Test with middle school students. Paper presented at the annual meeting of the Mid-South Educational Research Association, Little Rock, AR. (ERIC Document Reproduction Service No. forthcoming)

Melancon, J., & Thompson, B. (1989c, January). Measurement characteristics of a "no-guessing" administration of the Finding Embedded Figures Test. Paper presented at the annual meeting of the Southwest Educational Research Association, Houston. (ERIC Document Reproduction Service No. ED 303 487)

Melancon, J., & Thompson, B. (1989d, January). The nature of field independence: percentiles and factor structure of the Finding Embedded Figures Test--Research Edition. Paper presented at the annual meeting of the Southwest Educational Research Association, Houston. (ERIC Document Reproduction Service No. ED 303 520)

Melancon, J.G., & Thompson, B. (in press). Maximizing test reliability by stepwise variable deletion: A case study with the Finding Embedded Figures Test. Psychological Reports.

Messick, S. (1976). Individuality in learning. San Francisco: Jossey-Bass.

Paradise, L. V., & Block, C. (1984). The relationship of teacher-student cognitive style to academic achievement. Journal of

Research and Development in Education, 17, 57-61.

Pitts, M. C., & Thompson, B. (1984). Cognitive styles as mediating variables in inferential comprehension. Reading Research Quarterly, 19, 426-435.

Rasinski, T. (1983, October). Cognitive style and reading: Implications from field dependence research for reading instruction. Paper presented at the annual meeting of the Great Lakes Conference of the International Reading Association, Springfield, IL. (ERIC Document Reproduction Service No. ED 241 899)

Spiro, R. J., & Tirre, W. C. (1979). Individual differences in schema utilization during discourse processing. Urbana, IL: Center for the Study of Reading. (ERIC Document Reproduction Service No. ED 166 651)

Stasz, C., Shavelson, R. J., Cox, D. L., & Moore, C. A. (1976). Field independence and the structuring of knowledge in a social studies minicourse. Journal of Educational Psychology, 68, 550-558.

Thompson, B. (1989). Statistical significance, result importance, and result generalizability: Three noteworthy but somewhat different issues. Measurement and Evaluation in Counseling and Development, 22(1), 2-5.

Thompson, B., & Levitov, J. E. (1985). Using microcomputers to score and evaluate test items. Collegiate Microcomputer, 3, 163-168.

Thompson, B., & Melancon, J. (1987a). Finding Embedded Figures

Test. New Orleans: Psychometrics Group.

Thompson, B., & Melancon, J. G. (1987b). Measurement characteristics of the Group Embedded Figures Test. Educational and Psychological Measurement, 47, 765-772.

Thompson, B., & Melancon, J. (1988, January). Phase two study of the measurement characteristics of a test of field-independence. Paper presented at the annual meeting of the Southwest Educational Research Association, San Antonio.

Thompson, B., Pitts, M. M., & Gipe, J. P. (1983). Use of the Group Embedded Figures Test with children. Perceptual and Motor Skills, 57, 199-203.

Witkin, H. A. (1949). The nature and importance of individual differences in perception. Journal of Personality, 18, 145-170.

Witkin, H.A. (1979). Socialization, culture and ecology in the development of group and sex differences in cognitive style. Human Development, 22, 358-372.

Witkin, H. A., Moore, C. A., Gooderough, D. R., & Cox, P. W. (1977). Field-dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 47, 1-64.

Witkin, H. A., Moore, C. A., Oltman, P. K., Goodenough, D. R., Friedman, F., Owen, D. R., & Raskin, E. (1977). Role of the field-dependent and field-independent cognitive styles in academic evolution: A longitudinal study. Journal of Educational Psychology, 69, 197-211.

Witkin, H. A., Oltman, P. K., Raskin, E., & Karp, S. A. (1971). A manual for the Embedded Figures Test. Palo Alto, CA: Consulting Psychologists Press.

Table 1
Sample Demographics Across Studies

	n	Males	Yrs of Age Mean	SD
Melancon & Thompson (1989a)				
"power" and "selection" format--undergraduate students				
Both FEFT Parts	155	88 (56.8%)	19.82	2.91
Part A and GEFT	70	32 (45.7%)	19.72	4.07
Part B and GEFT	77	39 (50.6%)	18.74	2.05
Total	302	159 (52.6%)	19.52	3.06
Melancon & Thompson (1989b)				
"power" and "selection" format--middle school students				
Both FEFT Parts	60	28 (46.7%)	12.92	0.83
Only Part A	731	362 (49.5%)	12.83	1.21
Only Part B	737	341 (46.3%)	12.72	1.17
Total	1528	731 (47.8%)	12.78	1.18
Melancon & Thompson (1989c)				
"power" and "supply" format--undergraduate students				
	69	27 (39.1%)	20.04	3.12
Present study (Melancon & Thompson, 1990)				
"speed" and "selection" format--undergraduate students				
Both FEFT Parts	45	10 (22.2%)	18.90	0.33

Note. The number of subjects in grades six through eight in the Melancon and Thompson (1989b) study was 465 (30.4%), 622 (40.7%), and 441 (28.9%), respectively.

Table 2
Alpha Coefficients for Combined FEFT Parts

Item Set	Items	Alpha[a]	Alpha[b]	Alpha[c]	Alpha[d]
Non-linking items from both Parts A and B	40	.83	.84	.81	.80
35 Part A and 20 non-linking Part B items	55	.84	.88	.83	.85
35 Part B and 20 non-linking Part A items	55	.85	.88	.84	.86
All 70 items from both Parts A and B	70	.86	.90	.86	.89

[a]n = 69 undergraduate math students completing both FEFT Parts in a "no guessing" supply, "power" format (Melancon & Thompson, 1989c).

[b]n = 155 undergraduate math students completing both FEFT Parts in a multiple-choice selection, "power" format (Melancon & Thompson, 1989a).

[c]n = 60 middle school students completing both FEFT Parts in a multiple-choice selection, "power" format (Melancon & Thompson, 1989b).

[d]n = 45 undergraduate math students completing both FEFT Parts in a multiple-choice selection, "speed" format in the present study (Melancon & Thompson, 1990).

Table 3
FEFT Part A Item Statistics

Item		P	Corr IxAr	Corr IxTr	P	Corr IxAr	Val r	P	Corr IxAr	Corr IxTr	P	Corr IxAr	Val r	$\bar{P}$	$\overline{IxAr}$
		a	a	a	b	b	c	d	d	e	f	f	f		
1		942	028	057	649	289	147	942	180	147	733	202	226	82	17
2		783	186	095	693	314	137	808	262	345	711	235	211	75	25
3	L01	1000	——	——	911	331	243	885	228	208	956	377	081	94	31
4		855	230	218	773	356	220	736	238	119	867	193	-028	81	25
5		420	-203	-075	427	206	216	410	228	180	511	249	336	44	12
6	L02	942	263	271	747	263	360	603	310	316	644	3[illegible]	423	73	29
7	L03	275	111	024	387	261	268	214	088	195	200	067	154	27	13
8	L04	652	322	355	756	268	118	676	312	263	556	397	315	66	32
9		319	175	231	369	181	183	333	203	138	533	316	176	39	22
10	L05	667	191	270	653	268	115	327	062	-111	622	312	072	57	21
11		768	144	192	720	335	253	482	232	307	733	296	-088	68	25
12	L06	841	221	186	684	354	386	738	336	405	689	487	294	74	35
13		768	388	371	671	408	402	551	276	290	778	285	129	69	34
14	L07	928	006	-008	809	133	076	814	204	022	867	178	103	85	13
15	L08	362	072	178	382	250	122	378	312	328	422	232	227	39	22
16	L09	899	234	303	800	328	293	741	290	221	756	351	472	80	30
17		551	166	240	662	250	185	535	252	239	600	292	376	59	24
18		957	056	116	884	463	380	901	307	437	933	308	309	92	28
19	L10	957	-057	-035	836	346	186	847	268	098	844	337	332	87	22
20	L11	710	292	298	636	389	201	459	258	226	711	421	310	63	34
21	L12	928	218	238	858	294	136	871	297	206	911	505	361	89	33
22	L13	928	341	251	929	207	210	858	260	308	978	193	275	92	25
23		1000	——	——	867	376	355	923	314	271	978	193	275	94	29
24	L14	536	145	221	738	249	116	636	220	425	822	199	161	68	20
25		841	310	296	800	382	437	786	311	409	911	358	204	83	34
26		855	028	031	662	455	473	679	263	412	711	235	025	73	25
27		783	205	263	862	285	481	791	306	306	1000	——	——	86	27
28		899	451	384	760	298	018	805	366	205	978	363	174	86	37
29	L15	913	-052	042	756	406	420	675	328	282	689	301	466	76	25
30		797	374	247	502	161	-012	583	149	182	622	098	154	63	20
31		725	351	392	773	329	270	608	318	535	911	197	221	75	30
32		768	250	201	791	272	394	694	341	442	889	177	014	79	26
33		522	290	394	733	232	370	699	324	368	911	073	187	72	23
34		638	357	380	836	299	270	659	329	464	889	065	188	76	26
35		884	384	330	862	154	277	831	221	349	844	294	236	86	26
Mean		760	196	211	719	297	249	671	263	272	763	268	217		
SD		196	148	130	147	080	127	185	068	132	178	108	132		

Note. Linking items are designated with an "L" in the Item column. Decimals are omitted; statistics from the three studies are reported to three decimal values while mean statistics across the three studies are reported to two decimal places.

[a]n = 69 undergraduate math students completing both FEFT Parts in a "no guessing" supply format (Melancon & Thompson, 1989c).

[b]n = 225 undergraduate math students completing FEFT Part A in a multiple-choice selection format (Melancon & Thompson, 1989a).

[c]n = 70 undergraduate math students completing FEFT Part A in a multiple-choice selection format and the Group Embedded Figures Test (Melancon & Thompson, 1989a).

[d]n = 791 middle school students completing FEFT Part A in a multiple-choice selection format (Melancon & Thompson, 1989b).

[e]n = 60 middle school students completing both FEFT Parts in a multiple-choice selection format (Melancon & Thompson, 1989b).

[f]n = 45 undergraduate students in the present study completing both FEFT Parts in a "selection", "speeded" format and the GEFT (Melancon & Thompson, 1990).

Table 4
FEFT Part B Item Statistics

Item		P	Corr IxBr	Corr IxTr	P	Corr IxBr	Val r	P	Corr IxBr	Corr IxTr	P	Corr IxBr	Val r	$\bar{P}$	$\overline{IxBr}$
		a	a	a	b	b	c	d	d	e	f	f	f		
1	L01	1000	—	—	909	266	116	818	273	455	956	131	057	92	22
2		406	480	436	370	204	048	254	229	200	511	403	386	39	33
3		174	392	372	200	330	370	147	028	088	222	383	468	19	28
4		551	211	293	600	114	-034	469	330	163	756	316	288	59	24
5	L02	884	169	270	757	297	326	499	384	464	822	185	330	74	26
6	L03	333	136	191	357	274	259	184	075	106	178	529	383	26	25
7		333	456	427	509	379	242	287	292	419	578	133	235	43	31
8		580	491	445	683	282	123	521	270	376	778	234	140	64	32
9	L04	710	327	344	809	243	207	647	315	106	622	426	471	70	33
10		681	264	347	596	409	137	438	272	227	667	182	165	60	28
11	L05	681	354	339	661	361	481	536	304	318	644	196	102	63	30
12		580	318	325	691	246	017	491	144	301	733	375	215	62	27
13		188	524	527	278	252	289	227	088	168	311	351	348	25	30
14	L06	841	101	097	661	326	320	553	288	184	578	407	325	66	28
15	L07	899	042	079	852	152	142	744	166	212	844	202	167	83	14
16		754	394	423	626	290	121	545	280	307	578	549	506	63	38
17	L08	304	315	350	374	270	306	231	249	546	467	434	291	34	32
18	L09	942	302	338	848	371	261	671	303	423	844	374	277	83	34
19		971	184	223	952	285	272	917	295	251	956	279	009	95	26
20		768	423	485	765	409	482	555	422	462	867	353	395	74	40
21	L10	971	248	193	878	172	087	797	224	022	889	463	314	88	28
22	L11	696	433	407	722	444	465	449	353	125	778	441	403	66	42
23		768	258	168	691	157	189	604	250	213	711	223	353	69	22
24		493	344	325	557	370	236	419	288	379	778	149	-015	56	29
25		652	411	426	665	485	349	408	295	096	733	232	360	61	36
26	L12	899	219	171	830	372	354	749	361	207	956	258	177	86	30
27		797	441	449	874	239	271	841	287	283	911	287	152	86	31
28	L13	870	205	211	865	287	171	773	287	394	978	178	275	87	24
29	L14	507	159	191	752	230	124	519	294	379	867	184	030	66	22
30		522	336	329	517	292	091	400	120	274	556	423	295	50	29
31		609	537	489	796	346	400	631	285	244	911	302	256	74	37
32	L15	855	193	153	735	329	238	622	352	334	733	293	371	74	29
33		826	289	264	700	393	320	514	305	171	778	170	081	70	29
34		841	347	315	913	226	206	747	255	278	1000	—	—	88	28
35		406	416	381	604	280	190	438	209	149	622	426	491	52	33
Mean		665	315	317	674	297	234	533	262	266	717	308	268		
SD		227	124	115	186	084	126	194	085	127	203	116	140		

Note. Linking items are designated with an "L" in the Item column. Decimals are omitted; statistics from the three studies are reported to three decimal values while mean statistics across the three studies are reported to two decimal places.

[a]n = 69 undergraduate math students completing both FEFT Parts in a "no

guessing" supply format (Melancon & Thompson, 1989c).

[b]n = 232 undergraduate math students completing FEFT Part B in a multiple-choice selection format (Melancon & Thompson, 1989a).

[c]n = 77 undergraduate math students completing FEFT Part B in a multiple-choice selection format and the Group Embedded Figures Test (Melancon & Thompson, 1989a).

[d]n = 797 middle school students completing FEFT Part B in a multiple-choice selection format (Melancon & Thompson, 1989b).

[e]n = 60 middle school students completing both FEFT Parts in a multiple-choice selection format (Melancon & Thompson, 1989b).

[f]n = 45 undergraduate students in the present study completing both FEFT Parts in a "selection", "speeded" format and the GEFT (Melancon & Thompson, 1990).

Table 5
Mean Scores Across Studies

		Mean	SD
Melancon & Thompson (1989b) "power" and "selection" format			
	FEFT Part A[a]	23.5	5.1
	FEFT Part B[b]	18.6	5.5
	FEFT Total[c]	39.9	9.7
Melancon & Thompson (1989a) "power" and "selection" format			
	GEFT[d]	11.7	4.7
	FEFT Part A[e]	25.1	5.4
	FEFT Part B[f]	23.6	5.5
	FEFT Total[g]	48.8	10.6
Melancon & Thompson (1989c) "power" and "supply" format			
	FEFT Part A[h]	26.6	3.8
	FEFT Part B[h]	23.3	5.5
	FEFT Total[h]	49.9	8.6
Present study (Melancon & Thompson, 1990) "speed" and "selection" format		Mean	SD
	GEFT[i]	12.2	4.5
	FEFT Part A[i]	26.7	4.6
	FEFT Part B[i]	25.1	5.3
	FEFT Total[i]	51.8	9.4

[a]n = 791 middle school students including 60 completing both Parts
[b]n = 797 middle school students including 60 completing both Parts
[c]n = 60 middle school students completing both FEFT Parts
[d]n = 147 undergraduate students completing GEFT and one FEFT Part
[e]n = 225 undergraduate students
[f]n = 232 undergraduate students
[g]n = 155 undergraduate students completing both FEFT Parts
[h]n = 69 undergraduate students
[i]n = 45 undergraduate students